RD-27230-3 is a division of
RD-27230

WHAT IS CLAIMED IS:

1. A method of coating a CMC fiber, comprising:

passing said fiber through a reaction zone along a path substantially parallel to a longitudinal axis of said zone,

passing a flow of fiber coating reactant though said reaction zone; and

disrupting at least a portion of said flow of reactant from a path substantially parallel to said fiber path to create a mixing flow adjacent said fiber.

2. The method of claim 1, wherein said reaction zone is a CVD reactor chamber.

3. The method of claim 2, wherein said fiber is passed through a first seal through said CVD reactor chamber to discharge at a second seal of said reactor chamber.

4. The method of claim 1, wherein said fiber comprises a single monofilament fiber.

5. The method of claim 1, wherein said fiber comprises a fiber tow.

6. The method of claim 5, wherein a plurality of fiber tows are simultaneously passed through said reaction zone for coating.

7. The method of claim 1, wherein said fiber is a silicon carbide fiber.

8. The method of claim 1, wherein said fiber is an aluminum oxide fiber.

9. The method of claim 1, wherein said fiber is a silicon carbide-based fiber.

10. The method of claim 1, wherein said fiber coating reactant comprises a hydrocarbon.

11. The method of claim 1, wherein said fiber coating reactant comprises methane.

12. The method of claim 1, wherein said fiber coating reactant comprises boron trichloride and ammonia.

13. The method of claim 1, wherein said fiber coating reactant comprises boron trichloride, ammonia and a silicon precursor.

14. The method of claim 13, wherein the silicon precursor is selected from dichlorosilane, trichlorosilane, silicon tetrachloride and silane.

15. The method of claim 1, wherein said fiber coating reactant includes hydrogen or nitrogen.

16. The method of claim 1, wherein said reaction zone is maintained at a pressure about 0.05 Torr to about atmospheric pressure (760 Torr).

17 The method of claim 1, wherein said reaction zone is maintained at a pressure about 0.1 to about 50 Torr.

18. The method of claim 1, wherein said reaction zone is maintained at a pressure about 0.3 to about 10 Torr.

.19 The method of claim 1, wherein said reaction zone is maintained at temperature of about 700° to about 1800°C.

20. The method of claim 1, wherein said reaction zone is maintained at temperature of about 1100° to about 1550°C.

21. The method of claim 1, wherein said reaction zone is maintained at temperature of about 1350° to about 1500°C.

22. The method of claim 1, wherein a tow of fibers is passed through the reaction zone and the tows are spaced apart about 0.020 to about 1 inch.

23. The method of claim 1, wherein a tow of fibers is passed through the reaction zone and the tows are spaced apart about 0.045 to about 0.25.

24. The method of claim 1, wherein a tow of fibers is passed through the reaction zone and the tows are spaced apart about 0.05 to about 0.1 inch.

25. The method of claim 1, the fiber is passed through the reaction zone at a rate from about 1 to about 200 inches/minute.

26. The method of claim 1, the fiber is passed through the reaction zone at a rate from 5 to about 100 inch/minute.

27. The method of claim 1, the fiber is passed through the reaction zone at a rate from about 10 to about 60 inches/minute.

28. A coating reactor, comprising:

a reactor chamber to accommodate a fiber passing along a path substantially parallel to a longitudinal axis of said chamber and a flow of fiber coating reactant; and

a flow disrupter located within said reactor chamber to disrupt at least a portion of said flow of reactant from a path substantially parallel to said fiber path to create a mixing flow adjacent said fiber.

29. The coating reactor of claim 28, wherein said reactor chamber is a CVD reactor chamber.

30. The coating reactor of claim 29, wherein said CVD reactor chamber has a first seal to admit said flow of reactant and a second seal to discharge said flow of reactant.

31. The coating reactor of claim 30, further comprising a first fiber aperture through which said fiber can be pulled to enter the reactor chamber and a second aperture to allow exit of the fiber from the reactor chamber.

32. The coating reactor of claim 28, wherein said disrupter comprises a disrupter face angled about 10° to about 90° from said longitudinal axis of the reactor in a direction against said flow of reactant.

33. The coating reactor of claim 28, wherein said disrupter comprises a disrupter face angled about 15° to about 50° from said longitudinal axis of the reactor in a direction against said flow of reactant.

34. The coating reactor of claim 28, wherein said disrupter comprises a plurality of structures mounted intermittently along an inside wall of said reactor chamber.

35. The coating reactor of claim 28, wherein said disrupter comprises a forward angled face and a following angled face.

36. The coating reactor of claim 28, wherein said disrupter comprises a forward face that is angled 90 form said longitudinal axis of the reactor.

37. A coating reactor, comprising:

a reactor chamber to accommodate a fiber passing along a path substantially parallel to a longitudinal axis of said chamber and a flow of fiber coating reactant; and

a plurality of reactant injection inlets intermittently spaced along said longitudinal axis of said chamber and directed into said chamber at an angle to said fiber to create a mixing flow adjacent said fiber.

38. The reactor of claim 37, wherein said inlets are offset from each other along said longitudinal axis.

39. A coating reactor, comprising:

a reactor chamber to accommodate a fiber; and

a set of rollers along the interior of said chamber to convey the fiber tow repeatedly back and forth across the reactor longitudinal axis to interact with the reactant gas flow.